



US005896506A

United States Patent [19]

Ali et al.

[11] Patent Number: **5,896,506**[45] Date of Patent: **Apr. 20, 1999****[54] DISTRIBUTED STORAGE MANAGEMENT SYSTEM HAVING A CACHE SERVER AND METHOD THEREFOR**

[75] Inventors: **Seifu Ali**, Santa Clara, Calif.; **Thomas G. Burket**, Potomac, Md.; **Tawei Hu**, San Jose, Calif.; **Gerald Edward Kozina**, Cupertino, Calif.; **Thomas S. Lee**, San Jose, Calif.

[73] Assignee: **International Business Machines Corporation**, Armonk, N.Y.

[21] Appl. No.: **08/656,441**

[22] Filed: **May 31, 1996**

[51] Int. Cl.⁶ **G06F 13/38; G06F 15/17**

[52] U.S. Cl. **395/200.43; 395/200.46**

[58] Field of Search 707/1, 10, 9, 200, 707/2; 395/200.31, 200.49, 200.38, 200.46, 200.43; 711/138, 130

[56]

References Cited**U.S. PATENT DOCUMENTS**

3,569,938	3/1971	Eden et al.	
4,942,518	7/1990	Weatherford et al.	364/200
4,972,367	11/1990	Burke	
5,058,185	10/1991	Morris et al.	
5,161,214	11/1992	Addink et al.	
5,201,041	4/1993	Bohner et al.	395/425
5,214,768	5/1993	Martin et al.	
5,263,136	11/1993	DeAguiar et al.	
5,367,698	11/1994	Webber et al.	
5,412,791	5/1995	Martin et al.	
5,414,844	5/1995	Wang	
5,442,749	8/1995	Northcutt et al.	
5,495,607	2/1996	Pisello et al.	

5,504,873	4/1996	Marting et al.
5,508,732	4/1996	Bottomley et al.
5,511,208	4/1996	Boyles et al.
5,568,181	10/1996	Greenwood et al.
5,649,185	7/1997	Antognini et al.

OTHER PUBLICATIONS

Nayfeh, Exploring the Design Space for a Shared-Cache Multiprocessor, 1994.

IBM Technical Disclosure Bulletin, F.J. Affinito and P. L. Rosenfeld, "Prefetch Cache for Data Search with Limited Multiple-Porting", vol. 27, No. 7A, Dec. 1984.

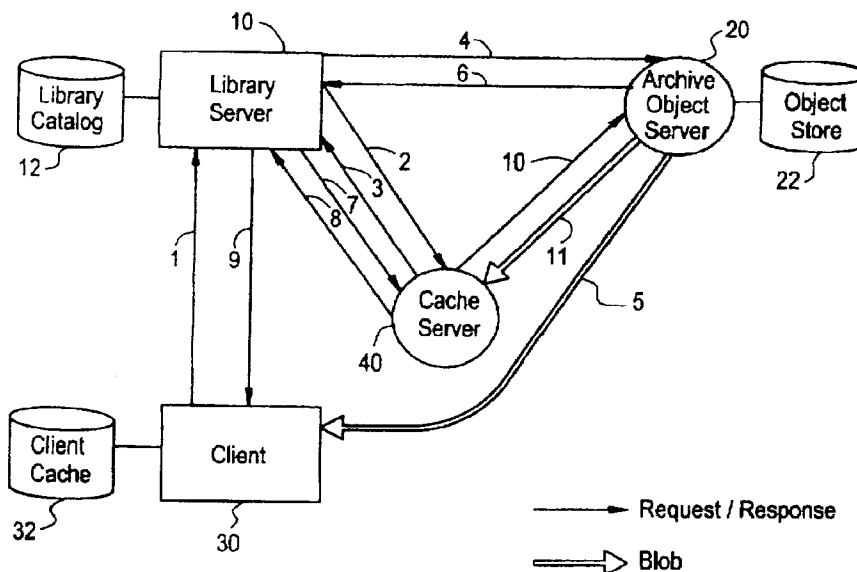
Primary Examiner—Mark H. Rinehart

Attorney, Agent, or Firm—Sughrue, Mion, Zinn, Macpeak & Seas, PLLC

[57]

ABSTRACT

The present invention is directed to a method and system for storing and managing objects, such as binary large objects (blobs) in a digital library system which includes a plurality of clients, an object server for storing an object, a cache server for storing a copy of the object, and a centralized server for storing information identifying the object as being stored in the object server and associating one or more of the clients with the cache server, in which one of the clients, as a requesting client, requests retrieval of an object, a copy of the requested object is sent from the cache server to the requesting client if the object is stored in said cache server, and a copy of said object is sent from the object server to said requesting client if the object is not stored in the cache server; and a copy of the requested object is sent from the object server to the cache server after the object server sends the object to the client, in which the object sent to the client is made available to the client regardless of whether sending of the copy of the object to the cache server is completed.

18 Claims, 8 Drawing Sheets



US005968125A

United States Patent [19]

Garrick et al.

[11] Patent Number: **5,968,125**[45] Date of Patent: **Oct. 19, 1999**

[54] **PROCESS FOR OPTIMIZING THE EFFECTIVENESS OF A HYPERTEXT ELEMENT**

[75] Inventors: **George R. Garrick**, Chicago; **Scott D. Weaver**, Deerfield, both of Ill.

[73] Assignee: **Net. Rol**, Chicago, Ill.

[21] Appl. No.: **08/787,532**

[22] Filed: **Jan. 21, 1997**

[51] Int. Cl.⁶ **G06F 13/00**

[52] U.S. Cl. **709/224; 709/219; 707/501; 707/513**

[58] Field of Search **709/203, 219, 709/207, 231, 224, 217, 218; 705/10; 395/200.54; 707/501, 513**

[56] **References Cited**

U.S. PATENT DOCUMENTS

B 4,777,596	6/1996	Shaffer et al.	364/419
5,541,911	7/1996	Nilakantan et al.	370/13
5,708,780	1/1998	Levergood et al.	709/218 X
5,732,218	3/1998	Bland et al.	709/229 X
5,848,396	12/1998	Gerace	705/10
5,864,852	1/1999	Luotonen	707/10

5,870,559 2/1999 Leshem et al. 709/224

OTHER PUBLICATIONS

Ari Luotonen et al., World-Web Proxies, CERN, Apr. 1994, pp. 1-8, W3C, <http://www.w3.org/>.

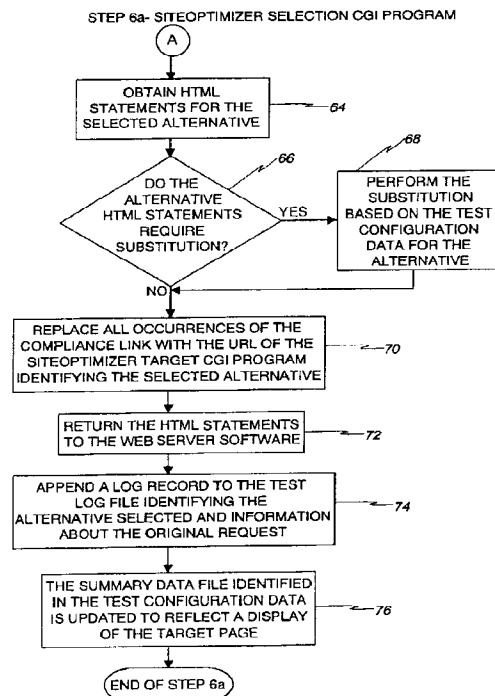
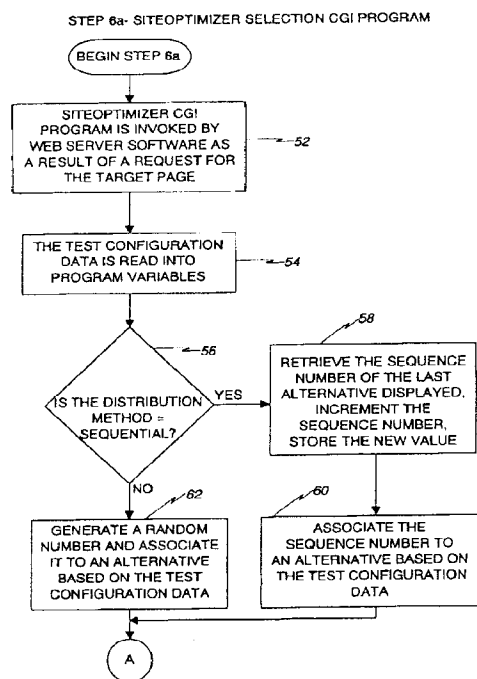
Primary Examiner—Zarni Maung

Assistant Examiner—Patrice L. Winder

[57] **ABSTRACT**

A process for optimizing the effectiveness of a web site analyzes various hypertext variables of hypertext documents formed from Hyper Text Mark-up Language (HTML) to identify weak links in order to improve compliances with the business objective for the web site. A plurality of alternate hypertext documents are created and placed in parallel paths relative to the original hypertext document according to a predetermined distribution pattern which may be sequential, equal distribution or random distribution, for example. Accesses to the web site are redirected to the alternative hypertext elements transparently. Access logs for each of the alternative hypertext documents are analyzed to determine the most effective alternative hypertext document, according to a predetermined criteria. The most effective hypertext element is then substituted for the original hypertext element in order to improve the effectiveness of the web site.

8 Claims, 22 Drawing Sheets





US006081829A

United States Patent [19]

Sidana

[11] **Patent Number:** **6,081,829**[45] **Date of Patent:** ***Jun. 27, 2000**[54] **GENERAL PURPOSE WEB ANNOTATIONS WITHOUT MODIFYING BROWSER**[75] Inventor: **Ashmeet S. Sidana**, Mountain View, Calif.[73] Assignee: **Silicon Graphics, Inc.**, Mountain View, Calif.

[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

[21] Appl. No.: **08/594,873**[22] Filed: **Jan. 31, 1996**[51] Int. Cl.⁷ **G06F 15/16**[52] U.S. Cl. **709/203; 707/512**[58] Field of Search **395/200.15, 200.03, 395/200.18, 200.31, 200.33, 200.76; 707/512**[56] **References Cited****U.S. PATENT DOCUMENTS**

5,239,466 8/1993 Morgan et al. 395/148
 5,708,780 1/1998 Levergood et al. 395/200.12
 5,822,539 10/1998 Van Hoff 395/200.66

OTHER PUBLICATIONS

M. Roscheisen et al, "Beyond browsing: shared comments, soaps, trails, and on-line communities," Apr. 10-19, 1995. "From the Editor," <http://www.dlib.org/dlib/July95/07editorial.wml> Jul. 1995 pp. 1-2.

Martin Roscheisen et al, Beyond Browsing; shared comments, soaps, trails and on-line communities, Computer Networks and ISDN Systems Journal, vol. 27, No. 6 p. 739-49, Apr. 1995.

Martin Roscheisen et al, "Beyond Browsing; Shared Comments, Soaps, Trails, and On-Line Communications", <http://www.diglib.stanford.edu/diglib/pub/rcports/brio.www95.html> pp. 1-15 Apr. 1995.

Martin Roscheisen et al, "Content Ratings and Other Third-Party Value-Added Information Defining an Enabling Platform", <http://www.cnri.neston.va.us/home/dlib/August95/Stanford/08roscheisen.html> Aug. 1995, pp. 1-2.

Martin Roscheisen et al, "Shared web Annotations As a Platform for Third-Party Value Added Information Providers", <http://www.diglib.stanford.edu/diglib/pub/report/commentor.html>, Nov. 94, pp. 1-33.

Martin Roscheisen et al, "ComMentor", <http://Walros.Stanford.EDU/Commentor/24Jan.1995> pp. 1-2.

Jim Davis, "CoNote, Draft in Progress", <http://dri.cornell.edu/pub/davis/Annotation/about.html>, Jan. 23, 1995 pp. 1-6.

Wayne C. Gramlich, "Public Annotation Systems", <http://playground.sun.com:80/ngramlich/1994/annotel>, 1994.

Net. Genesis et al., "Build a Web Site" by Prima Publishing, (1995), pp. 132-136.

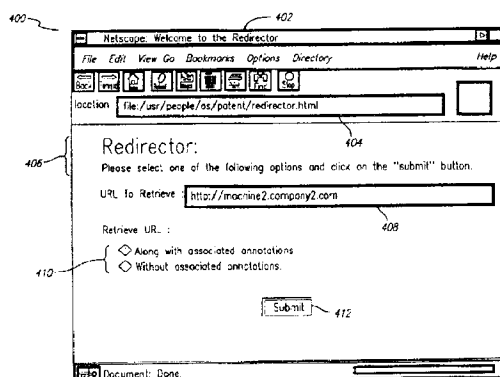
Rick Ayre et al., "The Internet Means Business" by PC Magazine, (May 16, 1995), pp. 195-197, 200-201.

(List continued on next page.)

Primary Examiner—Mehmet B. Geckil
Attorney, Agent, or Firm—Graham & James LLP

[57] **ABSTRACT**

A general purpose system and method for associating annotations, modifications, or other information with a web-viewable document is disclosed. An embodiment of the system and method includes the use of a "redirector." A user attempting to access a document at a particular web address, sends a request to view the document to that address. The request is intercepted by the redirector which, in turn, requests the document on behalf of the user. The redirector modifies the document and returns the modified document for viewing by the user. The modifications may include, for example, various comments or annotations to the original web-viewable document. According to the invention, such customized documents may be presented to the user without modification of commercially available browser and/or server software.

25 Claims, 11 Drawing Sheets



US006298356B1

(12) **United States Patent**
Jawahar et al.

(10) **Patent No.:** **US 6,298,356 B1**
(45) **Date of Patent:** **Oct. 2, 2001**

(54) **METHODS AND APPARATUS FOR
ENABLING DYNAMIC RESOURCE
COLLABORATION**

6,112,279 * 8/2000 Wang 711/119
6,144,996 * 11/2000 Starnes et al. 709/217

* cited by examiner

(75) Inventors: **Janardhanan Jawahar**, San Jose;
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Primary Examiner—Jack Choules
Assistant Examiner—Cheryl Lewis
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William D. Davis

(73) Assignee: **Aspect Communications Corp.**, San
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(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: 09/197,011

(22) Filed: Nov. 20, 1998

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/008,523, filed on
Jan. 16, 1998, now abandoned.

(51) Int. Cl.⁷ **G06F 17/30**

(52) U.S. Cl. **707/201; 707/10; 707/513;
707/2; 711/113; 709/203**

(58) Field of Search **707/201, 202,
707/2, 10, 513; 709/204, 203; 711/113**

(56) References Cited

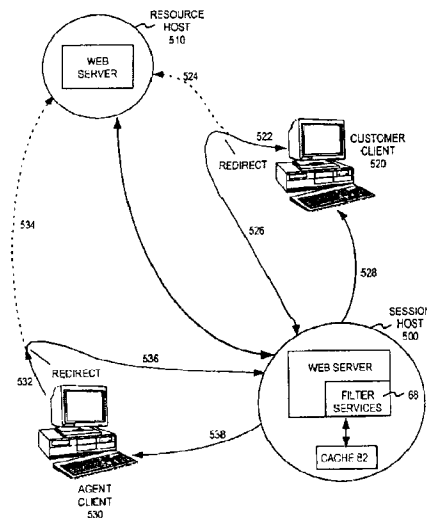
U.S. PATENT DOCUMENTS

5,931,904	*	8/1999	Banga et al.	709/217
5,991,796	*	11/1999	Anupam et al.	709/206
6,026,413	*	2/2000	Challenger et al.	707/202
6,029,175	*	2/2000	Chow et al.	707/104
6,055,569	*	4/2000	O'Brien et al.	709/223
6,070,185	*	5/2000	Anupam et al.	709/204
6,094,662	*	7/2000	Hawes	707/104
6,105,055	*	8/2000	Pizano et al.	709/204

(57) ABSTRACT

Methods and apparatus for enabling collaboration with web pages and other resources is described. A method includes the step of establishing a collaboration session between a first client and a second client. A requested resource is cached with the session host in response to a request having a first uniform resource locator (URL) issued by the first client, if the requested resource is a pre-determined type of resource. A second URL is provided to the second client. The second URL identifies the requested resource or the cached resource in accordance with whether the requested resource is cached. Apparatus for enabling collaboration includes a web server, a cache, and a filter. The web server provides a requested web page in response to a first client's request. The filter stores the requested web page in the cache, if the requested web page is a pre-determined type of web page. A number of pre-determined characteristics for caching are described in various embodiments of the methods and apparatus. In one embodiment, the requested resource is cached if it is a dynamic web page. In one embodiment an expiration date of the requested resource determines whether the requested resource should be cached. In another embodiment, a filename associated with the requested resource determines whether the requested resource should be cached. In another embodiment, components of the request determine whether the requested web page should be cached.

27 Claims, 16 Drawing Sheets





US006330561B1

(12) **United States Patent**
Cohen et al.

(10) **Patent No.:** US 6,330,561 B1
(45) **Date of Patent:** Dec. 11, 2001

(54) **METHOD AND APPARATUS FOR IMPROVING END TO END PERFORMANCE OF A DATA NETWORK**

(75) Inventors: Edith Cohen, Berkeley Heights, NJ (US); Balachander Krishnamurthy, New York City, NY (US); Jennifer Lynn Rexford, Summit, NJ (US)

(73) Assignee: AT&T Corp., New York, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 09/105,018

(22) Filed: Jun. 26, 1998

(51) Int. Cl.⁷ G06F 17/30

(52) U.S. Cl. 707/10; 707/2; 707/104

(58) Field of Search 707/101, 103, 707/10, 2, 104; 709/203, 228, 219, 247, 217, 202, 226, 223, 231, 200; 455/4.2; 711/122; 713/201

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,729,689 * 3/1998 Allard et al. 709/228
5,754,939 * 5/1998 Herz et al. 455/4.2
5,805,809 * 9/1998 Singh et al. 709/203
5,864,852 * 1/1999 Luotonen 713/201
5,918,013 * 6/1999 Mighdoll et al. 709/217
5,924,116 * 7/1999 Aggarwal et al. 711/122

5,933,832 * 8/1999 Suzuoka et al. 707/101
5,935,207 * 8/1999 Logue et al. 709/219
5,950,205 * 9/1999 Aviani, Jr. 707/103
5,996,022 * 11/1999 Krueger et al. 709/247
6,012,083 * 1/2000 Savitzky et al. 709/202
6,029,175 * 2/2000 Chow et al. 707/104
6,032,184 * 2/2000 Cogger et al. 709/223
6,038,601 * 3/2000 Lambert et al. 709/226
6,065,058 * 5/2000 Hailpern et al. 709/231
6,070,184 * 5/2000 Blount et al. 709/200
6,085,193 * 7/2000 Malkin et al. 707/10
6,151,601 * 11/2000 Papierniak et al. 707/10
6,212,560 * 4/2001 Fairchild 709/223

* cited by examiner

Primary Examiner—Wayne Amsbury

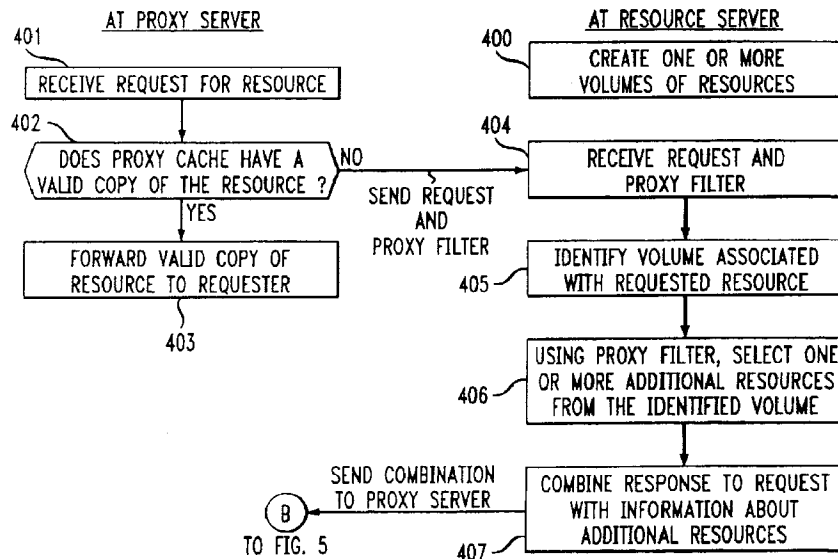
Assistant Examiner—L'huy Pardo

(74) Attorney, Agent, or Firm—Kenyon & Kenyon

(57) **ABSTRACT**

A method and apparatus provide improved cache coherency and more effective caching operations without placing an undue burden on network links. A proxy receives a request for a resource and then, depending on information in the proxy cache, generates a resource request for transmission to a resource server. The proxy appends a proxy filter to the request. The resource server maintains one or more volumes of resources based on some predetermined criterion that can be either static or dynamic in nature. Upon receipt of the request and the proxy filter the resource server generates a request response and a piggybacked list of additional resources selected from the volume with which the requested resource is associated.

4 Claims, 3 Drawing Sheets





US006470386B1

(12) **United States Patent**
Combar et al.

(10) **Patent No.:** **US 6,470,386 B1**
(45) **Date of Patent:** **Oct. 22, 2002**

(54) **INTEGRATED PROXY INTERFACE FOR
WEB BASED TELECOMMUNICATIONS
MANAGEMENT TOOLS**

(75) Inventors: **Curtis T. Combar**, Woodland Park;
Robert A. Pfister, Colorado Springs,
both of CO (US)

(73) Assignee: **WorldCom, Inc.**, Clinton, MS (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/159,516**

(22) Filed: **Sep. 24, 1998**

Related U.S. Application Data

(60) Provisional application No. 60/060,655, filed on Sep. 26,
1997.

(51) Int. Cl.⁷ **G06F 15/173**
(52) U.S. Cl. **709/224; 705/40**
(58) Field of Search **709/224, 223,**
709/218, 217, 219, 229; 379/112, 201,
265, 114, 140; 713/151, 154; 705/63, 75,
40, 44, 77

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,160,129 A 7/1979 Peyser et al.
4,345,315 A 8/1982 Cadotte et al.
4,817,050 A 3/1989 Komatsu et al.
4,893,248 A 1/1990 Pitts et al. **705/400**
4,972,504 A 11/1990 Daniel, Jr. et al.
5,041,972 A 8/1991 Frost
5,075,771 A 12/1991 Hashimoto
5,131,020 A * 7/1992 Liebesny et al. **379/59**
5,136,707 A 8/1992 Block et al.
5,223,699 A 6/1993 Flynn et al.
5,228,076 A 7/1993 Hopner et al.

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

EP 0 809 387 A2 5/1997
JP 9064870 A 3/1997
WO WO97/11443 3/1997
WO WO97/16911 5/1997
WO WO 97/23988 7/1997
WO WO 98/19472 5/1998
WO WO 99/01826 1/1999

OTHER PUBLICATIONS

Jainschigg, Billing confirmed Sep. 1994, Teleconnect, vol.
12, No. 9, p. 39(4).*

"HP and Cisco Deliver Internet Usage Platform and Billing
and Analysis Solutions, New Platform and Solutions Allow
ISPs and Carriers to Offer Value-added Services", Copy-
right 1998 Cisco Systems, Inc. [http://www.cisco.com/warp/
public/146/pressroom/1998/apr98/28.html](http://www.cisco.com/warp/public/146/pressroom/1998/apr98/28.html).

(List continued on next page.)

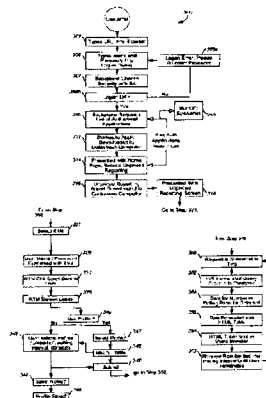
Primary Examiner—Robert B. Harrell

Assistant Examiner—Bunjoo Jaroenchonwanit

(57) **ABSTRACT**

A Web/Internet based monitoring system provides a com-
mon GUI enabling the requesting and real-time viewing of
telecommunication network traffic and statistical data per-
taining to a customer's telecommunication network. Such a
monitoring system includes: a client browser application
located at a client workstation for enabling interactive Web
based communications between a customer and the moni-
toring system; at least one secure server for managing client
sessions over the Internet via one or more secure connec-
tions; a device for generating statistical data based on
real-time call data obtained from a telecommunications
network, the statistical data being generated according to a
pre-defined user profile; a mechanism for periodically
retrieving the statistical data according to the user profile
and for integrating the retrieved statistical data within a Web
page for presentation to the user over a secure socket
connection at pre-defined intervals. The Web page is updated
to contain the latest generated statistical data each interval.

17 Claims, 21 Drawing Sheets





US 20020165988A1

(19) **United States**(12) **Patent Application Publication****Khan et al.**(10) **Pub. No.: US 2002/0165988 A1**(43) **Pub. Date: Nov. 7, 2002**

(54) **SYSTEM, METHOD, AND ARTICLE OF MANUFACTURE FOR WIRELESS ENABLEMENT OF THE WORLD WIDE WEB USING A WIRELESS GATEWAY**

(60) Provisional application No. 60/210,160, filed on Jun. 7, 2000. Provisional application No. 60/209,873, filed on Jun. 7, 2000.

Publication Classification

(76) Inventors: Umair A. Khan, Fremont, CA (US); Wasiq M. Bokhari, Fremont, CA (US); Quinton Y. Zondervan, Boston, MA (US); Simon Gansky, Berkeley, CA (US); Jonathan E. Rochez, Livermore, CA (US)

(51) **Int. Cl.⁷** **G06F 15/16**
(52) **U.S. Cl.** **709/246; 709/217**

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(57) **ABSTRACT**

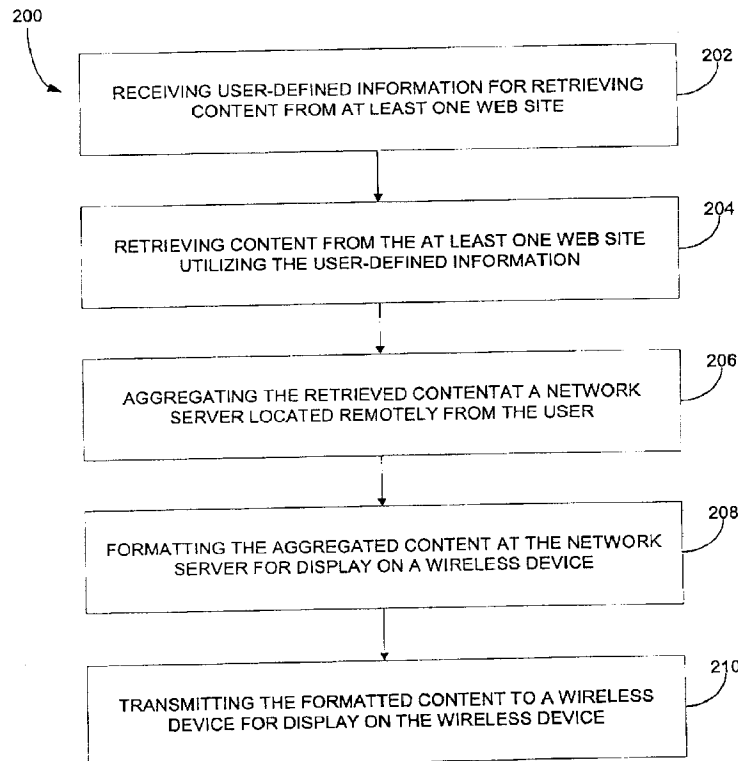
A system, method and article of manufacture are provided for selection and formatting of web content for remote viewing. User-defined information is received and used to retrieve content from one or more web sites. The retrieved content is aggregated at a network server located remotely from the user. The aggregated content is formatted at the network server for display on a wireless device. The formatted content is transmitted to a wireless device for display on the wireless device.

(21) Appl. No.: 10/165,734

(22) Filed: Jun. 6, 2002

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/595,781, filed on Jun. 16, 2000, now Pat. No. 6,438,575.





US006714979B1

(12) **United States Patent**
Brandt et al.

(10) **Patent No.:** **US 6,714,979 B1**
(45) **Date of Patent:** **Mar. 30, 2004**

(54) **DATA WAREHOUSING INFRASTRUCTURE
FOR WEB BASED REPORTING TOOL**

(75) Inventors: **Andre R. Brandt**, Colorado Springs,
CO (US); **Barbara Frueh**, Colorado
Springs, CO (US); **Sajan J. Pillai**,
Colorado Springs, CO (US); **Karl**
Rehder, Colorado Springs, CO (US);
Donald J. Shearer, Colorado Springs,
CO (US)

(73) Assignee: **WorldCom, Inc.**, Clinton, MS (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/159,402**

(22) Filed: **Sep. 24, 1998**

Related U.S. Application Data

(60) Provisional application No. 60/060,655, filed on Sep. 26,
1997.

(51) Int. Cl.⁷ **G06F 15/173**

(52) U.S. Cl. **709/225; 709/205; 709/217;**
709/223; 709/227; 709/229; 707/3; 707/4;
707/9; 707/10

(58) Field of Search **709/205, 225,**
709/227, 224, 219, 217, 228, 229, 223;
705/26, 18, 27, 51, 34; 713/155, 201, 152;
707/102, 523, 513, 2, 9, 3, 6, 10; 379/114.01,
114.02, 114.28, 114.29

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,160,129 A	7/1979	Peyser et al.	379/220.01
4,345,315 A	8/1982	Cadotte et al.	705/10
4,817,050 A	3/1989	Komatsu et al.	707/10
4,823,373 A	4/1989	Takahashi et al.	
4,893,248 A	1/1990	Pitts et al.	705/400
4,972,504 A	11/1990	Daniel, Jr. et al.	705/10
5,041,972 A	8/1991	Frost	705/10
5,075,771 A	12/1991	Hashimoto	725/46

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

EP	0 809 387 A2	5/1997
JP	09064870 A	3/1997
WO	WO97/11443	3/1997
WO	WO 97/16911	5/1997
WO	WO 97/23988	7/1997
WO	WO 98/19472	5/1998
WO	WO 99/01826	1/1999
WO	00/11573	3/2000

OTHER PUBLICATIONS

Quadri et al., Hewlett-Packard and Cisco Systems, Internet
Usage Platform White Paper.*

HP and Cisco Deliver Internet Usage Platform and Billing
and Analysis Solutions, New Platform and Solutions Allow
ISPs and Carriers to Offer Value-added Services.*

"HP Smart Internet, Transform User Data Into Revenue".*

HP Smart Internet Usage Analysis Solution, Transform User
Data Into Competitive Advantage.*

HP/Cisco, Internet Usage Platform, Transforming Internet
Services Into Revenue.*

(List continued on next page.)

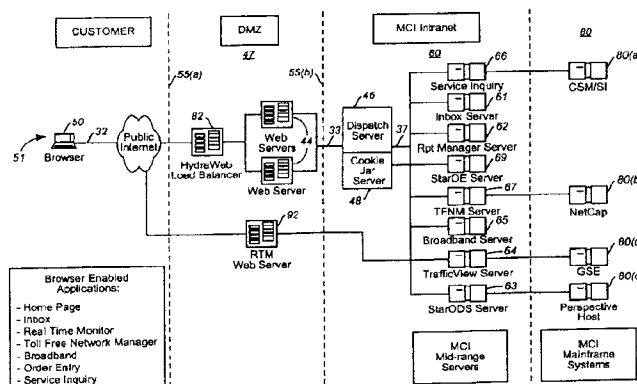
Primary Examiner—David Wiley

Assistant Examiner—William C. Vaughn, Jr.

(57) **ABSTRACT**

A data warehousing infrastructure for telecommunications
priced call detail data is integrated with a Web/Internet based
reporting system providing a common GUI enabling the
requesting, customizing, scheduling and viewing of various
types of priced call detail data reports. Such an infrastructure
performs an extraction process to obtain only those billing
detail records of entitled customers, and a harvesting process
for transforming the billing records into a star schema
format for storage in one or more operational data storage
devices. The system is integrated with a database server
supporting expedient and accurate access to the customer's
telecommunications priced call detail data for priced call
detail data report generation.

37 Claims, 23 Drawing Sheets





US007032031B2

(12) **United States Patent**
Jungck et al.

(10) **Patent No.:** **US 7,032,031 B2**
(45) **Date of Patent:** **Apr. 18, 2006**

(54) **EDGE ADAPTER APPARATUS AND METHOD**

5,805,820 A 9/1998 Bellovin et al. 395/200.55
5,867,704 A 2/1999 Tanaka et al. 718/105

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(Continued)

FOREIGN PATENT DOCUMENTS

WO 0 865 180 A2 3/1998

(Continued)

OTHER PUBLICATIONS

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 824 days.

Integrating Java-based Mobile Agents into Web Servers under . . . —Fünfroeken (1998) ; www.isa.informatik.tu-darmstadt.de/VS/Publikationen/Fuenfroeken/papers/hicss98-wasp.ps.*

(21) Appl. No.: **09/858,309**

(Continued)

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Primary Examiner—Thong Vu

(65) **Prior Publication Data**

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(74) Attorney, Agent, or Firm—Brinks Hofer Gilson & Lione

Related U.S. Application Data

(57) **ABSTRACT**

(63) Continuation-in-part of application No. 09/602,129, filed on Jun. 23, 2000, now Pat. No. 6,829,654.

(51) Int. Cl. **G06F 15/16** (2006.01)

(52) U.S. Cl. **709/246; 709/203**

(58) Field of Classification Search **709/246, 709/236, 227, 225, 229, 231, 240, 245, 203; 713/201, 166; 707/6, 10, 101, 104, 9; 715/536; 370/390, 401, 233, 395, 389**

See application file for complete search history.

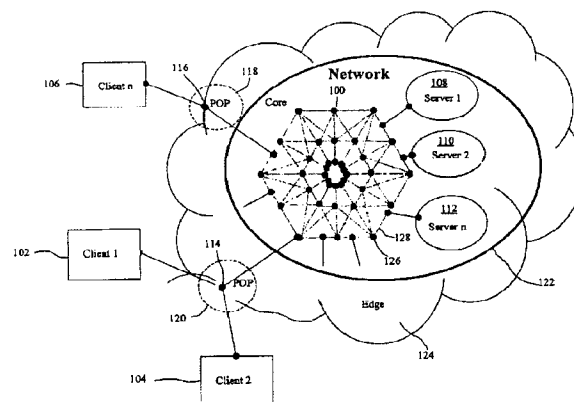
(56) **References Cited**

U.S. PATENT DOCUMENTS

4,692,918 A 9/1987 Elliott et al. 370/401
5,179,556 A * 1/1993 Turner 370/233
5,195,181 A 3/1993 Bryant et al. 709/215
5,566,170 A 10/1996 Bakke et al. 370/392
5,784,582 A 7/1998 Hughes 710/117

An apparatus and method for enhancing the infrastructure of a network such as the Internet is disclosed. A packet interceptor/processor apparatus is coupled with the network so as to be able to intercept and process packets flowing over the network. Further, the apparatus provides external connectivity to other devices that wish to intercept packets as well. The apparatus applies one or more rules to the intercepted packets which execute one or more functions on a dynamically specified portion of the packet and take one or more actions with the packets. The apparatus is capable of analyzing any portion of the packet including the header and payload. Actions include releasing the packet unmodified, deleting the packet, modifying the packet, logging/storing information about the packet or forwarding the packet to an external device for subsequent processing. Further, the rules may be dynamically modified by the external devices.

108 Claims, 9 Drawing Sheets



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.M./



US006502125B1

(12) **United States Patent**
Kenner et al.

(10) **Patent No.:** **US 6,502,125 B1**
(45) **Date of Patent:** **Dec. 31, 2002**

(54) **SYSTEM AND METHOD FOR OPTIMIZED STORAGE AND RETRIEVAL OF DATA ON A DISTRIBUTED COMPUTER NETWORK**

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(73) Assignee: **Akamai Technologies, Inc.**, Cambridge, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 89 days.

(21) Appl. No.: **09/635,289**

(22) Filed: **Aug. 9, 2000**

Related U.S. Application Data

(63) Continuation of application No. 09/213,946, filed on Dec. 17, 1998, now Pat. No. 6,154,744, which is a continuation of application No. 08/733,516, filed on Oct. 18, 1996, now Pat. No. 6,003,030, which is a continuation-in-part of application No. 08/660,540, filed on Jun. 7, 1996, now Pat. No. 5,956,716, which is a continuation-in-part of application No. 08/486,517, filed on Jun. 7, 1995, now Pat. No. 6,181,867.

(51) Int. Cl.⁷ **G06F 17/30**
(52) U.S. Cl. **709/203; 709/224**
(58) Field of Search **709/217, 203, 709/219, 223, 224, 226; 707/10**

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,730,313 A * 3/1988 Stephenson et al. 370/249
5,341,477 A * 8/1994 Pitkin et al. 709/203
5,459,837 A 10/1995 Caccavale
5,487,073 A * 1/1996 Urien 370/248
5,548,724 A * 8/1996 Akizawa et al. 709/105
5,557,320 A * 9/1996 Krebs 709/206
5,606,359 A * 2/1997 Youden et al. 725/88

5,991,809 A 11/1999 Kriegsman

OTHER PUBLICATIONS

Liu F.C. Performance Study of National SMDS Networks, Dec. 1992, Conference Record Global Telecommunications Conference GLOBECOM '92. IEEE, pp. 1040-1044.*
Mark E. Crovella and Robert L. Carter, Dynamic Server Selection In The Internet, Third IEEE Workshop on the Architecture and Implementation of High Performance Computer Systems '95, pp. 158-163, Mystic, Connecticut, Aug. 1995.

J. Guyton and M. Schwartz, Locating Nearby Copies of Replicated Internet Servers, University of Colorado at Boulder, Technical Report CU-CS-762-95, pp 1-18, Feb. 1995.

M. Seltzer and J. Gwertzman, The Case for Geographical Push-Caching, Proceedings of the 1995 Workshop on Hot Operating Systems, 1995.

Bestavros, et al., Application-Level Document Caching in the Internet, Boston University Technical Report No. BU-CS-95-002, pp 1-19, Jan. 15, 1995.

(List continued on next page.)

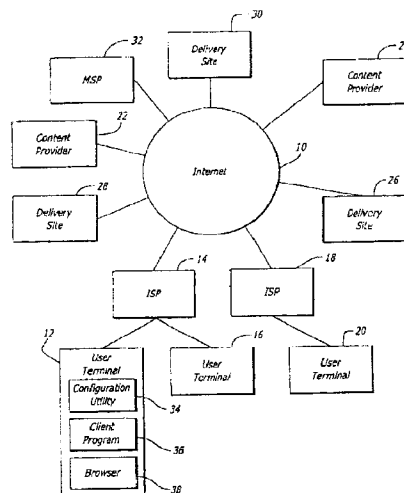
Primary Examiner—Jack Choules

(74) *Attorney, Agent, or Firm*—David H. Judson

(57) **ABSTRACT**

A system and method for the optimized storage and retrieval of video data at distributed sites calls for the deployment of "Smart Mirror" sites throughout a network, each of which maintains a copy of certain data managed by the system. Every user is assigned to a specific delivery site based on an analysis of network performance with respect to each of the available delivery sites. Generalized network performance data is collected and stored to facilitate the selection of additional delivery sites and to ensure the preservation of improved performance in comparison to traditional networks.

10 Claims, 3 Drawing Sheets



09/11/2008

/John Macilwinen/

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.M./